

(2) some causes affecting the Egyptian cotton crop; G. C. Dudgeon, the cottons in indigenous cultivation in British West Africa; A. E. Humphries, wheat production in relation to the requirements of the United Kingdom; F. B. Guthrie, (1) work done in New South Wales in connection with the improvement and testing of wheats, (2) the work of the late W. J. Farrer on the improvement of wheat in New South Wales; I. B. Pole-Evans, problems connected with maize-growing in South Africa; J. B. Carruthers, (1) new methods of tapping *Castilloa*, (2) cover plants, as a substitute for weeding in rubber, cacao, and other cultivations; Dr. T. A. Henry and Dr. S. J. M. Auld, the burning quality of tobacco; G. M. Odum, tobacco culture in South Africa; Mr. Easterby, cultivation and varieties of sugar-cane at the Sugar-cane Experiment Station, Mackay, Queensland; Prof. P. Carmody, (1) preparation of rubber, (2) preparation of paper from megass, (3) methods of manuring, suitable for natives, (4) influence of malarial diseases on labour supply, (5) breeding of stock suitable for the tropics; Mr. Benson, manuring of tropical fruits; Dr. S. S. Pickles, the aromatic grass oils; R. N. Lyne, causes contributing to the success of the Zanzibar clove industry; W. Macdonald, dry-farming and land settlement in South Africa; J. H. Barnes, the alkali lands of northern India; E. M. Jarvis, economic zoology in African colonies; W. Gill, the introduction of the remarkable pine (*Pinus insignis*) into South Australia, and its successful utilisation; F. W. Barwick, African wild silks; G. C. Dudgeon, some important insect pests in British West Africa; C. C. Gowdey, insects of economic importance in Uganda. The International Association of Colonial Agriculture has also arranged for the collection, in tropical countries, of information on a number of subjects of special interest, and general reports on these will be presented to the congress, as well as reports by experts in each country concerned. The inquiries already arranged for are on cotton cultivation, labour conditions in the colonies and tropical countries, acclimatisation of European cattle in tropical countries, and alcoholism in the tropics. All communications regarding the congress should be sent to the secretary of the British committee, Imperial Institute, London, S.W. Applications and subscriptions for membership should be sent to M. Vandervaeren, treasurer of the Belgian committee, at the Ministry of the Interior and of Agriculture, Brussels, Belgium.

### ECONOMIC GEOLOGY IN CANADA.<sup>1</sup>

THE pamphlets mentioned below have been issued recently by the Department of Mines of Canada, mainly with the object of directing attention to the importance of the economic mineral products of the Dominion, and of assisting with trustworthy information those persons who are actually engaged, or may contemplate engaging, in the exploitation of its mineral wealth.

The first work on the list gives a concise but clear description of the general geological features of Canada and of the known valuable minerals that characterise the different areas. For the sake of convenience, the whole of the Dominion is divided into a number of regions, each of which has a more or less definite individual geological structure, and which accordingly produces a distinct series of economic minerals. The scope of the work is perhaps most readily explained by giving a list of the different regions into which the Dominion is here divided, these being as follows:—

(1) The Appalachian region, comprising the Maritime Provinces and that portion of the Province of Quebec which lies immediately to the north of them, consisting mainly of crystalline and Palæozoic rocks, the chief mineral products being coal, gold, and iron ores.

(2) The Lowlands of the St. Lawrence Valley, which consist mainly of Palæozoic strata, and have not, so far,

shown any great mineralogical wealth, with the exception of petroleum; the principal Canadian oilfields, lying in the tongue of south-western Ontario that projects between Lakes Huron and Erie, occur in strata of Devonian age, which form a portion of this region.

(3) The Laurentian plateau, which comprises the greater portion of the Province of Ontario and of the North-western Territory; it consists mostly of pre-Cambrian—largely Laurentian—rocks, and though little more than the southern border of this vast tract has been prospected, it is known to contain many valuable mineral products, such as the Sudbury copper-nickel deposits, the Cobalt silver deposits, gold, iron ores, corundum, apatite, mica, &c.

(4) The Arctic archipelago, which forms an imperfectly known area to the north of Hudson's Bay; it appears to consist mainly of pre-Cambrian and some Palæozoic strata, and so far is not known to contain minerals of any great economic importance.

(5) The Interior Continental plain, which comprises the western portion of Manitoba and the southern portion of Saskatchewan and Alberta, extending westwards to the Cordilleran mountain system, the strata being largely of Cretaceous age. The rocks contain very important beds of coal and lignite, also bitumen, indications of petroleum, and natural gas.

(6) The Cordilleran belt, which comprises the western portion of the Dominion. This is essentially a mountain region, showing a great variety of geological formations; it is noted for occurrences of the precious metals, gold and silver, whilst lead, copper, and zinc also occur; it is also very rich in coalfields, notably in British Columbia, where all varieties of coal from lignite to anthracite appear to occur.

This brief summary of a summary will serve to indicate the arrangement, the scope, and the objects of this little treatise; it should also be added that it is accompanied by two maps, one showing the broad geological features, and the other the distribution of the chief mineral products; the former is very satisfactory, but the latter is by no means so clear as might be desired. The maps serve, however, perfectly well their purpose of elucidating the text and of making the whole subject clear and readily comprehensible. Minute accuracy of detail is not to be expected in such a work as this, and is perhaps not even desirable, so that anything of the nature of criticism would be entirely out of place. It can only be said that the treatise admirably fulfils its objects, and should be of the greatest value to all who are in any way interested in the mineral wealth of the Dominion. The Geological Survey of Canada can only be congratulated upon the felicitous idea of publishing such a pamphlet and upon the excellent way in which that idea has been carried into execution.

In the second pamphlet of the above list Mr. D. B. Dowling has given an account of the coalfields of the Interior Continental Plateau, and is thus able to discuss more in detail than was possible in the general work the nature and mode of occurrence of these important deposits. The author commences with a historical and general review of the coalfields, and then describes them in some little detail. He points out that the coal of this region occurs at three main geological horizons, namely, at the base, about the middle, and close to the top of the Cretaceous formation; it should be noted that he ventures, on what can only be described as imperfect data, to attempt an estimate of the quantity of coal that exists in the region under discussion, which he gives as 143,490 millions of tons, the area of the coalfields being taken as 22,506 square miles. That the amount of development work yet done in these fields is of the scantiest possible description is evident from the fact that the output for the year 1907 was only 876,731 tons. After a detailed description of the coalfields, a large number of analyses of the various coals is tabulated. This list is an exceedingly useful one, and the author has done excellent service in collecting the records into a conveniently accessible form. Following this list is another of analyses of coals from other districts, apparently for the purposes of comparison; it is, however, not at all clear on what principle he has brought together this miscellaneous collection of analyses of coals from British Columbia, Yukon, Nova Scotia, Wales,

<sup>1</sup> Canada Department of Mines. (1) "A Descriptive Sketch of the Geology and Economic Minerals of Canada." By G. A. Young, with an introduction by R. W. Brock. Pp. 151.

(2) "The Coal Fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia." By D. B. Dowling. Pp. 111.

(3) "The Whitehorse Copper Belt, Yukon Territory." By R. G. McConnell. Pp. 63.

(4) "Report on the Iron Ore Deposits along the Ottawa (Quebec Side) and Gatineau Rivers." By Fritz Cirkel. Pp. 147.

Australasia, and the United States, still less why the whole of the coals of Great Britain should be considered to be adequately represented by analyses of some half a dozen Welsh coals. Such a comparative list should either be truly representative or else (and perhaps better) be omitted altogether. There appears to be no obvious reason why Mr. Dowling should want any new-fangled mode of classification in order to enable him satisfactorily to classify these coals. For most practical purposes the old classification of Gruner answers perfectly well, and if anything more precise is required, the fuel ratio (or the ratio of the fixed carbon to the volatile combustible matter) suffices for most purposes. The ratio suggested by the author, which he calls the "split volatile" ratio, appears to serve no particular purpose, and, on the other hand, would enable a coal to be put into almost any class at will by merely drying it more or less thoroughly before analysing it.

The two remaining treatises deal in more or less detail with ore deposits in definite regions, differing mainly in this respect that the copper deposits of the Whitehorse Belt have been opened up pretty extensively and are being actively worked to-day, whilst the iron ores of the Ottawa and Gatineau Rivers are not to-day of any economic importance.

The last treatise on the list is in some respects the least satisfactory. So long as the writer keeps to his proper subject, namely, a description of the ore deposits, their modes of occurrence, distribution and geology, there is little fault to be found, although the language is in places somewhat less clear than might be wished. It is, however, when the author ventures into metallurgical discussion that he seems to go widely astray. It is incomprehensible how anyone could write such a sentence as the following in discussing the metallurgy of iron (p. 104):—"By no known chemical or electro-thermic process can phosphorus be eliminated from the bath of any of the diverse metallurgical furnaces." The author seems to be exceedingly sanguine as to the future of the electrical production of pig-iron in the Dominion, an opinion which he seems to share with some other Canadian geologists. It is somewhat curious to note that it is the geologists who are urging on this metallurgical development, whilst manufacturers of iron appear to be more than doubtful as to its economic possibilities. Whether this is due to the well-recognised conservatism of the latter and the advanced scientific enterprise of the former, or whether it is a case of geologists rushing in where iron-masters fear to tread, is not for us to determine.

HENRY LOUIS.

#### RECENT PAPERS ON BIRDS.

MR. C. W. BEEBE is to be congratulated on his attempt (*Zoologica*, No. 5) to explain the "racket-making" habit of the motmots. These birds, it is almost unnecessary to mention, are in the habit of removing the vanes of the middle pair of elongated tail-feathers for a certain distance, so as to give them a racket-like form very similar to that which occurs naturally in certain kingfishers and humming-birds. It is shown that the length of feather thus deviated is invariably constant, even when the adjacent pair of feathers, which might serve as a guide, has been removed. Further, the portion destined to be stripped has the vanes markedly narrower than in the rest of the feather, while the component barbs and barbules are much weaker and less coherent than elsewhere, so that their removal is a comparatively easy matter. Consequently, in the course of the preening to which these birds subject all their tail-feathers, the weak area in the vanes of the middle pair becomes stripped, with the production of the symmetrical pair of terminal rackets. The original cause of the narrowing and degeneration in the affected area is still unknown, but the author is of opinion that it is not a case of the inheritance of an acquired character.

In No. 2 of the same serial Mr. Beebe gives the results of his observations on the habits of that remarkable bird the hoazin, or hoatzin (*Opisthocomus cristatus*), made during a visit in March, 1908, to Venezuela, and a second in April of the following year to British Guiana. As young birds were not to be found, the notes relate only to the adult. Mr. Beebe commences his account by mentioning

that the crop of the hoazin is unique on account of having assumed the structure and function of the gizzard of other birds, being much larger than ordinary, with the walls thick and muscular instead of thin and flabby. Despite this specialised feature, the primitive character of this bird is indicated by many points, the vestigial claw of the third digit of the wing linking it with Archaeopteryx, while another claim to primitiveness is apparent in the quadrupedal habits of the young. Thickly wooded river-valleys form the haunts of the hoazin, of which Lower Amazonia may be considered the centre, the distributional area, according to our present information, being in several instances discontinuous. The bird has a peculiarly disagreeable odour of its own, which is, however, in Mr. Beebe's opinion, less powerful than commonly reputed, and, at all events, insufficient to render it immune to the attacks of parasites. In general character the nest and eggs are very similar to those of the Guiana green herons (Butorides), but are placed higher above the water. Both sexes assist in nest-building, and two eggs seem to be the usual number in a clutch. There is no foundation for the assertion that these birds are polygamous, or, of course, for the old legend as to their snake-eating habits.

The institution and celebration of the first "bird-day" in the Australian Commonwealth is recorded in the January number of the *Emu*. October 29, 1909, was the date selected in Victoria, when the celebration proved a thorough success, parents, teachers, and scholars joining in with enthusiasm, and visits being paid to noted bird-haunts in the different districts. Numerous nests were examined, but in no instance were either birds or eggs molested. A certain amount of preliminary work had to be done in teaching the children the names of many of the local birds, for which purpose special lists were prepared. In the same issue Mr. C. Barrett describes the nesting of the rock-parrakeet (*Neophema petrophila*) on Goat Island, Kellidic Bay. Here this appropriately named species rears its young in hundreds, the eggs being often laid deep down in burrows, although higher up on the cliffs they are frequently placed on the bare rock, in most cases under the protection of a raised stone.

In the March number of the *Zoologist* Mr. J. M. Dewar describes the manner in which the oyster-catcher breaks the shell of the purple whelk (*Purpura lapillus*) in order to be able to feed on its contents. As the soft-parts of this mollusc are much more difficult of access than those of mussels and limpets, the bird only occasionally attacks the whelk, and perhaps never does so at all in some localities. When a mollusc is to be operated upon, it is carried to some convenient spot, often a crack or hollow in the rock, or it may be a hard patch of sand, where it is laid with the mouth uppermost. The upper half of the beak is then introduced into the aperture, and an attempt made to punch out a small fragment from the opposite surface of the shell. If this is successfully accomplished, and the piece punched out is of small size, the beak is introduced into the new aperture, and the same process repeated higher up the shell, when, if it succeeds, the soft-parts can be scooped out. In cases where the first hole is larger, the latter operation can be accomplished by that aperture. Frequently the shell defies the bird's efforts.

The January number of the *Victorian Naturalist* contains the report of a paper, by Mr. A. H. E. Mattingley, on the breeding-habits of Australian cuckoos, in which it is stated that only an infinitesimal proportion of their eggs approximate in size, colour, markings, and shape to those among which they are laid. There are, moreover, numerous instances in which Australian cuckoos have laid in the nests of graminivorous birds, with the consequent starvation of the young. In other instances cuckoos lay in nests already containing eggs of their own species, while they also make use of nests too small to contain the young bird in comfort. It is concluded that, so far at least as Australian species are concerned, cuckoos, in place of possessing an instinct leading to the selection of suitable foster-parents, lay their eggs haphazard.

Ever since the year 1904 Dr. F. A. Forel has been endeavouring to ascertain the approximate number of individuals of the black-headed gull (*Larus ridibundus*) which resort to Lake Lemán during certain months of the year, and likewise to explain the reason why many